

**Notes on *Willemia virae* KAPRUS' and *Anurida carpatica* BABENKO, two springtails new for the Polish fauna, with remarks on other Collembola collected in caves of the Beskid Niski Mountains (Polish Carpathians)**

DARIUSZ SKARŻYŃSKI\*, ADRIAN SMOLIS\*\*

Zoological Institute, University of Wrocław, Sienkiewicza 21, 50-335 Wrocław, Poland  
e-mail: \*hypogast@biol.uni.wroc.pl, \*\*adek@biol.uni.wroc.pl

**ABSTRACT.** *Willemia virae* KAPRUS', 1997 and *Anurida carpatica* BABENKO, 1998 are recorded for the first time from Poland. Notes on their morphology are given. A list of Collembola collected in two caves of the Beskid Niski Mountains (Polish Carpathians) is also provided.

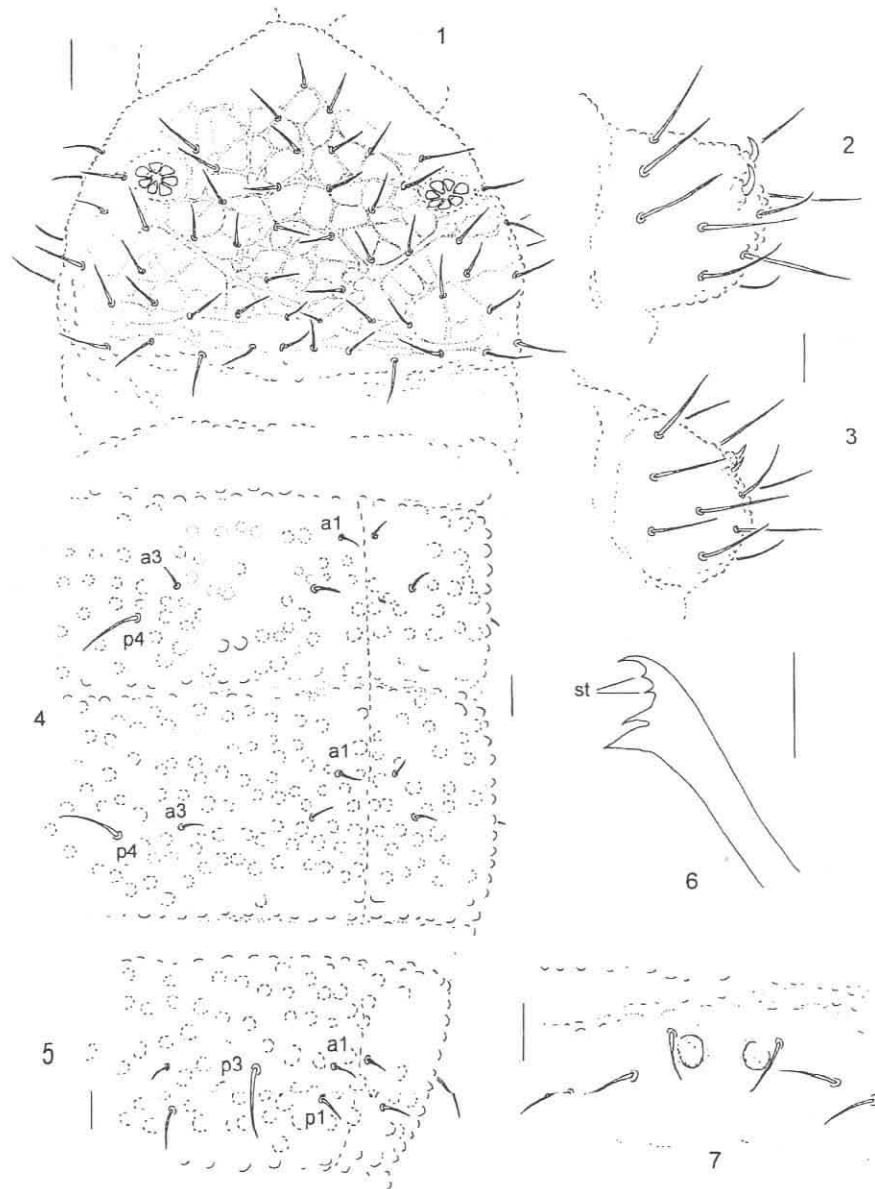
**KEY WORDS:** *Collembola*, *Willemia virae*, *Anurida carpatica*, new records, morphology, faunistics, caves, Beskid Niski Mountains, Poland.

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Our knowledge on the springtails fauna of the Beskid Niski Mountains (Carpathians, SE Poland) is far from satisfactory. In the faunistic literature concerning this territory (SMOLIS et al. 2001, SMOLIS 2002 a, b) only 10 species were recorded. During the faunistic trip (on the 14<sup>th</sup> of May, 2002), to two caves of the Cergowa Mountain (716 m a.s.l): "Pod Bukiem" cave and "Na Wierzchowinie" cave, we collected 42 springtail species, including two new to the Polish fauna.

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**Figs 1-6.** 1-3. *Willemia virae* KAPRUS'. 1 – head (dorsal side), 2 – anal spines of Ukrainian specimen, 3 – anal spines of Polish specimen, 4-7. *Anurida carpatica* BABENKO. 4 – chaetotaxy of abdominal terga I-II, 5 – chaetotaxy of abdominal tergum V, 6 – mandible, 7 – central part of abdominal sternum IV. Scale bar 0.01mm.

***Willemia virae* KAPRUS', 1997**

(Figs 1-3)

6 females, 8 males and 1 juvenile were found in the soil and litter samples collected in a twilight zone of the "Na Wierzchowinie" cave.

This species was recently described from Ukraine (KAPRUS' 1997) and till now it was known only from the *locus typicus* (Ukraine, "Druzhba" cave, Zakarpats'ka Oblast). Studies on the Polish specimens, as well as the type material that we had obtained thanks to the kindness of Dr. Igor Kaprus' (State Museum of Natural History, NASU, Lviv, Ukraine) made it possible to give some notes on the morphology of *W. virae*.

All the studied specimens have a subcutaneous reticulation in the central part of head (Fig. 1). The structure was also visible on all thoracic terga and abdominal terga I-III of the Polish individuals freshly mounted on slides. This character is shared by three Polish species of the genus *Willemia* BÖRNER, 1901, namely *W. denisi* MILLS, 1932, *W. scandinavica* STACH, 1949 and *W. virae*. The postantennal organ consists of 5-7 lobes (Fig. 1). The setae  $a_4$  on the thoracic terga II-III are usually present in the Polish individuals, whereas in the Ukrainian ones they are usually absent. Consequently, a diagnostic significance of this variable character seems to be rather low. Length of the anal spines varies from 3  $\mu$ m to 10  $\mu$ m, however the Polish individuals have the anal spines shorter (3-5  $\mu$ m) than the Ukrainian ones (7-10  $\mu$ m) (Figs 2 & 3).

*W. virae* is closely related to *W. scandinavica* from which it clearly differs in the absence of setae  $m_4$  and  $m_6$  on the abdominal tergum IV, and the absence of setae  $p_2$  on the abdominal tergum V.

***Anurida carpatica* BABENKO, 1998**

(Figs 4-7)

1 female and 2 males were found in the soil and litter samples collected in a twilight zone of the "Na Wierzchowinie" cave.

Up to date, this species was known only from the *locus typicus* (a litter of beech-spruce and beech-fir forests, Skolevskije Beskidy Mountains, Ukraine) (BABENKO 1998).

Morphological characters of the Polish specimens fit generally the original description of *A. carpatica*, however there are some differences which extend a range of variability of this species. Polish specimens have strong subapical mandibular teeth (st) (Fig. 6), 3+3 setae on the thoracic tergum I, the setae  $a_3$  on the abdominal terga I-III situated close to the row p (abd. I) or in the row p (abd. II-III) (Fig. 4), sensilla  $p_3$  on the abdominal tergum V situated in the row a (Fig. 5), roundish tubercles on the abdominal sternum IV each with one seta at the base (not at the top) (Fig. 7). Moreover, there are some small differences in the chaetotaxy of head, but unfortunately it is difficult to interpret them without comparing to the type material. The most evident character is the lack of the median seta  $d_1$ .

**Table.** A list of Collembola collected in "Na Wierzchowinie" cave (NW) and "Pod Bukiem" cave (PB).

Species	NW	PB
<i>Ceratophysella denticulata</i> (BAGNALL, 1941)	+	-
<i>C. neomeridionalis</i> (NOSEK & ČERVEK, 1970)	+	-
<i>C. silvatica</i> RUSEK, 1964	+	-
<i>Willemia virae</i> KAPRUS', 1997	+	-
<i>Superodontella pseudolamellifera</i> (STACH, 1949)	+	-
<i>Friesea mirabilis</i> (TULLBERG, 1871)	+	-
<i>Pseudachorutes palmiensis</i> BÖRNER, 1903	+	+
<i>Anurida carpatica</i> BABENKO, 1998	+	-
<i>A. granulata</i> AGRELL, 1943	+	+
<i>Deutonura albella</i> (STACH, 1920)	+	+
<i>D. stachi</i> (GISIN, 1952)	-	+
<i>Endonura tatricola</i> (STACH, 1951)	+	-
<i>Thaumanura carolii</i> (STACH, 1920)	-	+
<i>Tetrodontophora bielensis</i> (WAGA, 1842)	+	+
<i>Kalaphorura paradoxa</i> (SCHÄFFER, 1900)	+	-
<i>Micraphorura absoloni</i> (BÖRNER, 1901)	-	+
<i>Protaphorura subuliginata</i> GISIN, 1956	+	+
<i>Orthonychiurus rectopapillatus</i> (STACH, 1933)	+	+
<i>Mesaphorura hylophila</i> RUSEK, 1982	+	+
<i>M. sylvatica</i> (RUSEK, 1971)	+	-
<i>M. tenuisensillata</i> RUSEK, 1974	+	-
<i>Subisotoma pusilla</i> (SCHÄFFER, 1900)	+	-
<i>Folsomia lawrencei</i> RUSEK, 1984	+	+
<i>F. penicula</i> BAGNALL, 1939	+	+
<i>Proisotoma minima</i> (ABSOLON, 1901)	-	+
<i>Isotomiella minor</i> (SCHÄFFER, 1896)	+	+
<i>Isotoma notabilis</i> SCHÄFFER, 1896	+	-
<i>I. olivacea</i> TULLBERG, 1871	+	-
<i>I. tigrina</i> (NICOLET, 1842)	+	-
<i>Tomocerus minor</i> (LUBBOCK, 1862)	+	-
<i>Plutomurus carpaticus</i> RUSEK & WEINER, 1978	+	+
<i>Pogonognathellus flavescens</i> (TULLBERG, 1871)	+	+
<i>Heteromurus nitidus</i> (TEMPLETON, 1835)	+	-
<i>Lepidocyrtus lanuginosus</i> (GMELIN, 1788)	+	-
<i>Pseudosinella zygophora</i> (SCHILLE, 1908)	+	+
<i>Megalothorax minimus</i> WILLEM, 1900	+	+
<i>Sminthurides schoetti</i> (AXELSON, 1903)	+	-
<i>Arrhopalites pygmeus</i> (WANKEL, 1860)	+	+
<i>Sminthurinus aureus</i> (LUBBOCK, 1862)	+	-
<i>Dicyrtoma fusca</i> (LUBBOCK, 1873)	+	-
<i>Lipothrix lubbocki</i> (TULLBERG, 1872)	+	-
<i>Heterosminthurus</i> sp.	-	+

In the investigated caves, *A. carpatica* lives together with its related species, *A. granulata* ÅGRELL, 1943, from which it differs in the structure of maxilla and in reduced chaetotaxy (see BABENKO 1998, FJELLBERG 1998).

The material collected in both caves comprised 42 species of Collembola (Table). Springtails were collected in various microhabitats (from the entrance to a dark zone), using commonly accepted methods, i.e. taking soil and litter samples, moss tufts, followed by an extraction with the Tullgren apparatus; catches with exhaustor, and flotation of fragments of rotting wood have been also utilized.

Springtails fauna of the investigated caves is not specific and it has originated from the adjacent habitats – litter, soil and moss of the beech forest. It contains species common in the Carpathian forests (WEINER 1981, KAPRUS' 1999, STERZYŃSKA & KAPRUS' 2000). Exclusively *W. virae* can tentatively be considered as a troglobiotic species. However, its distribution is insufficiently known to draw out the final conclusions regarding its ecological preferences.

It is noteworthy, that during the same faunistic trip we have collected *Mesogastrura ojcoviensis* (STACH, 1919) in a hollow of a beech situated near the "Na Wierzchowinie" cave. This troglobiotic, guanobic species (THIBAUD 1970, WEINER 1981) is a common dweller of European caves, including also the Polish ones (WEINER 1981, SKARŻYŃSKI 2001). It is possible, that *M. ojcoviensis* inhabits other caves of the Beskid Niski Mountains, where bats live.

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